REMARKS

Rejections to the Claims:

35 USC § 102(b)

In the Final Office Action, dated July 27, 2005, the Examiner rejected Claim 1 under 35 U.S.C. § 102(b) as being anticipated by Tanjyo et al (US Pat. No. 5,189,303), herein referred to as the "Tanjyo patent."

In particular, the Examiner stated that, regarding Claim 1, the Tanjyo patent teaches "an ion source (referring to Figure 1) comprising a plasma generating chamber (referring to 6 in Figure 1), magnets (referring to 9 and 10 in Figure 1) arranged around the chamber (referring to 6 in Figure 1), a filament (referring to 7 in Figure 1) which is heated by a filament power source (referring to 16 in Figure 1) wherein the electric discharge can be a glow discharge (AC), a gas port (referring to 8 in Figure 1) , a bias DC power source (referring to 17 in Figure 1) , and an array of magnets (referring to 40 in Figure 2) disposed in an extraction plate (referring to 2 in Figure 1) arranged at the exit of the chamber (referring to 6 in Figure 1) and (referring to column 5 line 4 to column 6 line 30, and column 10 line 50 to column 11 line 20)."

Regarding Claim 1 rejection over the Tanjyo patent

The Applicants have submitted with this Request for Continued Examination (RCE) a new set of claims which the Applicants believe overcome the art cited by the Examiner.

The Federal Circuit stated that under 35 U.S.C. § 102(b), "There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention" *Scripps Clinic & Research Found. V. Genentech Inc.*, 927 F.2d 1576 (Fed. Cir. 1991). Thus, "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under

consideration." *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

Furthermore, the Federal Circuit stated that under 35 U.S.C. § 102, "anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim" *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452 (Fed. Cir. 1984).

Therefore, in order to establish a prima facie case of anticipation the Examiner must set forth an argument that provides (1) a single reference (2) that teaches or enables (3) each of the claimed elements (as arranged in the claim) (4) either expressly or inherently and (5) as interpreted by one of ordinary skill in the art. All of these factors must be present, or a case of anticipation is not met.

Currently amended independent Claim 1 of the present invention recites the limitation that "... an oxygen source for introducing oxygen gas into the plasma generation reaction chamber in the body through the gas port; ... an oxygen plasma producing element for producing oxygen plasma by heating the filament to thermionic temperatures using the AC power source, causing primary electrons to be emitted therefrom, and to collide with the oxygen gas, producing oxygen plasma including a portion of primary electrons; and an array of filtration magnets ... wherein the filtration magnets pass the oxygen plasma to the plasma source exit and prevent the primary electrons from entering the downstream region of the reaction chamber." The Applicants submit that this limitation is not taught, disclosed, or suggested in the Tanjyo patent. Specifically, the Tanjyo patent does not disclose or even suggest the structural limitations of "an oxygen source for introducing oxygen gas into the plasma generation reaction chamber;" "an oxygen plasma producing element for producing oxygen plasma by heating the filament to thermionic temperatures, causing primary electrons to collide with the oxygen gas, producing oxygen plasma;" and "an array of filtration magnets that pass the oxygen plasma to the plasma source exit."

In addition, the Examiner previously stated that "The Tanjyo patent teaches all the limitations of Claim 1except for the plasma comprising atomic oxygen ions." The Examiner further stated that "It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531, (CCPQ 1959). In view of the Examiner's comments, the Applicants refer the Examiner to the currently amended Claim 1, wherein Claim 1 has been amended to satisfy the structural limitations required for Apparatus claims. Therefore, the Applicants submit, that the Tanjyo patent teaches an ion source for producing wide, large area type ion beams with a mass-separation device (referring to lines 1 and 2 of the abstract), but the Tanjyo patent does not specifically teach "an oxygen plasma generating element" as claimed by Claim 1 of the present invention.

Therefore, the Applicants submit that the Tanjyo patent, in combination with the knowledge of one skilled in the art, does not teach, disclose or suggest all of the claim limitations of the amended Claim 1.

Because the Tanjyo patent fails to teach all the elements of Claim 1, arranged exactly as in Claim 1, for reasons discussed above, the Applicants respectfully requests that this rejection of Claim 1 under 35 U.S.C. § 102(b) be withdrawn.

35 USC§ 103(a)

The Examiner rejected the original Claims 2, 7, 8, and 11 under 35 U.S.C. § 103(a) as being unpatentable over Tanjyo et al (US Pat. No. 5,189,303), herein referred to as the "Tanjyo patent," in view of Leung et al (US Pat. No. 5,198,677), herein referred to as the "Leung patent."

The Examiner stated that the Tanjyo patent teaches all the limitations of the claims of the present invention with the exception of the filament formed of tungsten, the cooling jacket for cooling the magnets arranged around the chamber, and the cylindrical molybdenum shield.

The Examiner further stated that the Leung patent teaches an ion source (referring to Figure 1) that includes a filament (referring to 57 in Figure 1) made of tungsten, a cooling channel formed between a plasma generation chamber (referring to 12 in Figure 1) and cylindrical wall (referring to 14 in Figure 1) for cooling magnets (referring to 13 in Figure 1) in the channel, and a liner (referring to 45 in Figure 1) made of a high temperature resistant material such as molybdenum provided within the chamber (referring to column 3 line 10 through column 4 line 10).

The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the filament material, the magnet cooling mechanism, and the liner as taught by the Leung patent in the apparatus of the Tanjyo patent as a suitable material for filament, cooling the magnets, and protecting the inner surface of the chamber from plasma attack, respectively.

Regarding the original Claim 7 (Currently Amended Claim 8) rejection under 35 USC§ 103(a)

The Applicants have submitted with this Request for Continued Examination (RCE) a new set of claims which the Applicants believe overcome the art cited by the Examiner.

As noted by MPEP 2143.03 to establish a *prima facie* case of obviousness, all the claim limitations must be taught or suggested by the prior art. The Applicants respectfully submit that the combination of the Tanjyo patent with the Leung patent does not teach all of the claim limitations of the currently amended Claim 1 and the currently amended Claim 8 (previously Claim 7). Specifically, the Applicants assert that the combination does not teach, disclose, or suggest "... an oxygen source for introducing oxygen gas into the plasma generation reaction chamber in the body through the gas port; ... an oxygen plasma producing element for producing oxygen plasma by heating the filament to thermionic temperatures using the AC power source, causing primary electrons to be emitted therefrom, and to collide with the oxygen gas, producing oxygen plasma including a portion of primary electrons; and an array of filtration magnets ... wherein the filtration magnets pass the oxygen plasma to the plasma source exit and prevent the primary

electrons from entering the downstream region of the reaction chamber." As previously stated and repeated here for clarity, the Applicants submit that this limitation is not taught, disclosed, or suggested in the Tanjyo patent or in the Leung patent. Specifically, the combination of the Tanjyo patent with the Leung patent does not disclose or even suggest the structural limitations of "an oxygen source for introducing oxygen gas into the plasma generation reaction chamber;" "an oxygen plasma producing element for producing oxygen plasma by heating the filament to thermionic temperatures, causing primary electrons to collide with the oxygen gas, producing oxygen plasma;" and "an array of filtration magnets that pass the oxygen plasma to the plasma source exit."

Therefore, the Applicants submit that the Leung patent, in combination with the Tanjyo patent and the knowledge of one skilled in the art, does not teach, disclose or suggest all of the claim limitations of the currently amended Claims 1 and 8 (previously Claim 7).

For the foregoing reasons the Applicants respectfully believe that currently amended Claim 8 (previously Claim 7), as written, is patentable over the combination of prior art references and respectfully requests that this rejection of Claim 8 (Currently Amended, previously Claim 7) under 35 USC §103(a) be withdrawn.

Dependent Claims

The Applicants have submitted with this Request for Continued Examination (RCE) a new set of claims which the Applicants believe overcome the art cited by the Examiner.

Claims 3-7 (previously Claims 2-6) are dependent upon Claim 1 (Currently Amended) and Claims 10-16 (previously Claims 8-14) are dependent upon Claim 8 (Currently Amended, previously Claim 7). For the reasons given above, the Applicants submit that Claims 1 and 8 (previously Claim 7) are patentable over the cited prior art. Therefore, the Applicants submit that Claims 3-7 (previously Claims 2-6) and Claims 10-16 (previously Claims 8-14) are also patentable over the cited prior art at least based on their dependence upon an allowable base claim.

Furthermore, the Applicants submit that the present invention provides a solution to an unsolved need in a crowded art, and as such, the present invention should be regarded as significant and thus, non obvious. The present invention is classified in the crowded art of optical quality diamond polishing. Specifically the present invention relates to the use of plasma-enhanced chemical etching techniques for polishing a synthetic diamond to an optical quality surface (referring to the present invention page 1 line 10, and the new Claim 2). In the crowded art of optical quality diamond polishing there are several methods to polish diamonds to optical quality, however they require repetitive ion implantation and high ion energies, which can result in directional sputtering on the diamond's surface (referring to present invention page 2). In addition, the repeated scanning of the beam over a diamond sample is a slow and expensive process. In contrast, the present invention provides an apparatus for rapid, uniform, safe, and cost-effective synthetic diamond polishing (referring to present invention pages 3-10, new Claim 2, figures 1, 2, and 5) by generating high concentrations of low energy atomic oxygen ions over a large surface area. The diamond is quickly and uniformly polished by placing the diamond on the path of the oxygen plasma exiting through the plasma source exit of the invention, and by keeping the diamond in the path of the oxygen plasma until the surface of the diamond sample has optical quality smoothness. Furthermore, the oxygen plasma producing element disclosed in Claim 1 can operate at lower voltages than apparatus for ion implantation, thereby reducing both capital investment and safety concerns. Moreover, because the oxygen plasma producing element of the present invention generates a large plume of oxygen plasma, large diamond samples can be polished in their entirety without beam scanning, thus multiple samples can be polished simultaneously and quickly.

For the foregoing reasons the Applicants respectfully believe that the present invention provides a solution to an unsolved need in a crowded art, and as such, the present invention should be regarded as significant and thus, non obvious. Therefore, the Applicants respectfully request that these rejections of Claims 3-7 (previously Claims 2-6) and Claims 10-16 (previously Claims 8-14) under 35 USC §103(a) be withdrawn.

New Claims

New Claims 2 and 9 have been added. Support for new Claims 2 and 9 can be found in the currently pending claims and on pages 3-10 of the specification, and in figures 1, 2, and 5 (referring to 130 in figures 1, 2, and 5). Applicants submit that these new claims are patentable over the cited prior art. Specifically the Applicants submit that the cited prior art does not teach, disclose or suggest "a container for placing at least one diamond sample, wherein said at least one diamond sample has a surface, and wherein the container is positioned in the path of the oxygen plasma exiting through the plasma source exit, and the said at least one diamond remains in the path of the oxygen plasma until the surface of the diamond sample has optical quality smoothness."

Closing Remarks:

In view of the foregoing, it is respectfully submitted that all now pending Claims 1-16 are in allowable condition. Reconsideration is respectfully requested. Accordingly, early allowance and issuance of this application is respectfully requested.

In the event the Examiner wishes to discuss any aspect of this response, or believes that a conversation with either the Applicants or Applicants' representative would be beneficial the Examiner is encouraged contact the undersigned at the telephone number indicated below.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to the attached credit card payment form. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to the attached credit card payment form.

Respectfully submitted,

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